RECLAMATION'S PRELIMINARY LIST

Red-flag issues identified with the BDCP Administrative Draft, February 2012, Chapter 5 Effects Analysis

This document provides general comments about the approach, results, and interpretation of BDCP project effects to salmonids and advice for moving forward to address the red flags identified.

Species-level deficiencies- While ICF recognizes the need to assess project-level benefits and adverse impacts to individual runs of salmon and steelhead- winter, spring-run, fall/late fall, steelhead- the net effects analysis groups them all together. This 'grouping' approach is problematic for several reasons.

(1) Salmon are not regulated or managed as a 'group'. Section 7 consultations occur on individual salmon runs. Federal gencies will need to understand project net effects on the individual salmon runs and for steelhead individually.
(2) Stressors can have different population-level impacts to individual runs. For example, mainstem Sacramento River temperature exceedences play a fundamental role in winter-run population dynamics, whereas fall-run are less impacted by the Sacramento River mainstem temperature exceedences due to biological differences in habitat use and timing.
(3) Conservation measures can have different population-level benefits to individual runs. For example, winter-run and spring-run fish may benefit from the Yolo Bypass conservation measure to a greater extent than fall or late-fall juvenile salmon.
(4) Portfolio effect in interpretation- the analytical consequence of grouping the salmonids in this effort is that 'on average' the 'salmonids' appear to experience minimal project level adverse effects. However, the results for individual salmon runs, identifies significant impacts. For example, when one averages the stressor of temperature among winter, spring, fall, and steelhead, even though winter-run shows a significant impact, the other runs are less effected by temperature- Thus BDCP temperature effects are 'rolled' up as not being a significant impact to 'salmonids'. This same type of averaging or grouping belies the impacts of several different stressors to individual salmon runs (e.g., entrainment to spring-run).

Table 5.5-16 *Change to Stressors because of BDCP by life stage- River salmonids*, shows a rank of '0' for temperature for 'salmonids' with high certainty for eggs, juvenile, and adults. A rank of '0' indicates no beneficial or adverse impacts. When assessing temperature impacts to winter-run, the OBAN life-cycle modeling results suggest that there is a significant impact to egg survival due to temperature (rank score= -3) with moderately low certainty (rank score= 2) page 5.5-82.

Recommendation: Present net effects for individual runs of Chinook salmon and steelhead at the same temporal and spatial scale as required in Section 7.

Biological goals and objectives- The effects analysis does not provide information on whether the metrics identified under the biological goals and objectives are achieved by the PP. This is relevant, as a PP that does not achieve the biological goals and objectives for the species may be considered deficient for that species. Table 5.2-24 identifies whether the objective is assessed in the EA, yet, for those that are identified as being assessed, no summary information is provided about whether it is achieved or not achieved by the PP.

Recommendation: Add an additional column indicating whether the PP achieves the goals and objectives.

Population-level stressors- The premise for the net effects analysis begins with defining the stressors for salmonids and ranking them on their magnitude of importance and their uncertainly. There appears to be little relationship between the amount of science support and the factors' certainly ranking scores. For example, for the stressor 'transport flows' as defined by 'Change in flow through the Delta as a result of upstream regulation or diversion' was given high stressor scores, but with an uncertainty rating of "speculative, no quantitative analysis and little applicable literature". It is difficult to reconcile the uncertainty ranking based on the criteria established in the EA. There are several scientific papers that are cited in the rational (p. 5.5-55). In addition, the flow-survivorship functions in the partial life cycle model (DPM) that is used in the EA have scientific support. The uncertainty rankings for Alternative Channels, channel margin, and predation need better justification.

Upstream project effects- Disconnect between upstream impacts and delta benefits. There is inconsistent information on the role that BDCP plays in affecting upstream conditions. The EA acknowledges that one indirect consequence of managing a North of Delta facility is that there is reservoir re-operation that has the potential to impact upstream river conditions. Individual appendices to the EA show changes to upstream conditions due to reservoir reoperation. However, Table 5.5-16 shows that there are no changes to stressors (Water operations, habitat including temperature, water quality, or predation) due to BDCP by life stage in-river. This is problematic because the project benefits occur in the project area- the delta. In many cases, the project benefits may not be actualized due to poor population conditions upstream. For example, winter-run egg mortality may be so high in some water years, that the population may not benefit from downstream improvements. This is illustrated by the OBAN life cycle results which show wildly significant differences in adult escapement in the majority of years between

PP_ELT and EBC2_ELT (p. 5.5-82).

Recommendation: Adequately summarize upstream project effects in net effects for individual runs of Chinook salmon and steelhead at the same temporal and spatial scale as required in Section 7. Indicate the extent to which these upstream impacts may be significant enough to preclude fish population responses to PP benefits in the delta.

Entrainment- One of the articulated benefits of CM1 and dual conveyance is the reduced reliance on south delta for exports and thus an overall reduction in fish loss due to water operations. This benefit is suggested in Table 5.5-15. *Change to stressors because of the BDCP by life stages- Delta Salmonids* (p. 5.5-61) with a rank benefit score of (3). While it is accurate based on the analyses to date, that in wetter water year conditions, entrainment is reduced for most salmon runs and steelhead, in drier years there is a negative effect of the PP primarily for spring-run at fall-run salmon. Entrainment for spring-run increases 51%, 49%, and 11% in Below Normal, Dry, and Critical years and for fall-run 30% in Dry years (p. 5.5-68).

Recommendation: Adequately contextualize entrainment effects in net effects for individual runs of Chinook salmon and steelhead at the same temporal and spatial scale as required in Section 7 and for different water year types. Indicate the extent to which these entrainment impacts may be significant enough to preclude fish population responses to PP benefits in the delta, especially in drier years.

Updated appendices- The Delta Passage Model is an important tool to assist in the net effects for the different life stages, conservation actions, and changes in environmental factors affected by the PP. Recognizing that this EA does not utilized the most current DPM model, technical staff did not spend a considerable amount of time using the results from the DPM to evaluate red-flag concerns for salmonids. The metric of the proportion of fish that exit the delta at Chipps for different scenarios will be valuable in the future.

Recommendation: Apply the modified DPM in the EA.

Comments on green and white sturgeon

The narrative includes misunderstandings about the function and conditions of CVP facilities. In the green and white sturgeon section (p 5.5-113 ln 7-15), the discussion focuses on upstream barriers to adult sturgeon and identifies closure of the DCC during winter and spring as a barrier. The analysis proceeds to suggest the BDCP modification of DCC closure will reduce this barrier by operating the DCC more flexibly. Two issues stick out. First, its not clear that the BDCP DCC operation would open the DCC during winter and spring more based on the description on CM1. Water Operations. Second, while the DCC could be described as a barrier, the channel and the barrier being open is the manmade condition and the *real* historic condition would not have a linkage between the Mokelumne Forks and the Sacramento River. So, to characterize a benefit as opening the DCC suggests that the historic condition, when there was a natural barrier between these channels, seems to state the historic condition has a negative impact of fish migration. When describing the environmental baseline (p 5.2-3 ln 25-28), it appears this document (dated February 2012) was just taken from other previous version of the effects analysis where is makes statements like the fall X2 action "has not been triggered due to recent dry hydrologic conditions…" In the description of CM1, the effects of the DCC on fish migration lacks an understanding of the science completed on the DCC by CALFED in the early 2000s, when it was operated on a tidal or daily cycle for fish protection.

The described method for determining net effects on fish species is not applied to green and white sturgeon. There is an initial description of a method for determining net effects on fish (p 5.2-19), which includes an integration process looking at stressors, effects of stressors on each life stage based on appendices' results, and an integration step to create an overall index of effects of the BDCP. This approach is not done for green and white sturgeon, which makes acknowledging net effects on these species due to the BDCP difficult to compare to the baseline conditions. The Net Effect Section (p 5.5-118 ln 37-38) summarizes that "beneficial changes of the Plan as greater than adverse impacts", but this was not actually done. If the approach described in the earlier part of this section was followed, the likely primary stressors of early life stages (i.e. mismatch between spawning and transport flows in key habitats with presences of spawning and larval fish; which have been demonstrated to likely cause recruitment failures in other North American sturgeon) would outweigh subadult and adult benefits due to food web, habitat, and predation reduction.

Interpretation of Appendices' results are sometimes contradictory, and the rationale behind benefits and risks are not ecologically based. When describing beneficial effects of the BDCP, the discussion on flow rates during the GST egg incubation period states part of the period flows are higher, while during the other portion of the period flows are lower (p. 5.5-113. Ln 37-41). Having more flow (which does not impact the species) early does not make it for having less flow later, although this is what is suggested in the interpretation that early flows are "expected to at least offset the adverse effects of reduced Jul and August flows." In fact, such a situation may result in spawning during the early period that exposes larvae and juvenile to unsuitable flows, in which the ecological mismatch between biology and the environment results in all eggs going into habitats that could represent poorer quality.

The linkage between CMs and benefits is frequently not communicated in the Effects Analysis. Passage of green and white sturgeon as a benefit of actions under CM2 Yolo and CM 14 SDWC is inadequately described (p. 5.5-114 ln 1-22). Reading this section, I question the mechanisms suggested to benefit sturgeon via this actions due to the temporal distribution of these species related to the actions and the life stages described to benefit from the actions. The description of the benefits of CM2 to sturgeon passage seems to focus on DCC operations, but perhaps these sentences are out of place (ln 6-12). Where describing CM2 Yolo's benefit to the food web, the narrative appears to be from other sections describing multiple species. There is lack of specificity regarding how CM2 food web subsidization may benefit a particular life stage of green or white sturgeon (p 5.5-115 ln. 1-7). To adequately describe this benefit the minimum should be considered: What do sturgeons eat from the floodplain? Where do feeding white or green sturgeon (and which life stage) occur in relationship to the floodplain? What proportion of green sturgeon may be in that location during December through March? Cumulatively, would this impact individuals, populations, or species? Some mechanism linking CM 13 Invasive Vegetation Control (p 5.5-115 ln 27-35) related to benefiting sturgeon prey is necessary otherwise the description seems speculative and hypothetical. In the Net Effects Section (p 5.5.-118, ln 15-19), additional CMs are reviewed (i.e. CM ?? contaminant reduction) with questionable statements about linkages between sturgeon biology and selenium. DRERIP models should be review to look at the adverse impact of selenium, and an adverse impact of increased selenium be adequately described.

Biology of the species should be verified to be congruent with conceptual models. In the discussion of adverse effects related to flow reductions (p 5.5-116 ln 28-35; remember earlier it was described how this was at least offset by flow increases earlier), the periodicity of white and green sturgeon migration could be verified with conceptual models. They do not seem to reflect the periods in the DRERIP models, but maybe these are just typos regarding life stage or months. Legal harvest of white sturgeon clearly is the major driver in the size structure of the adult population via management of a slot limit, yet habitat restoration is suggested to benefit the fecundity of the sturgeon (p 5.5-117 ln 26-30; this could go under the comment above poor linkage between CMS and benefits).

Qualitative assessments of effect made without any support. "Increased predation associated with the north Delta Diversion will have a small adverse effect on sturgeon abundance." (p. 5.5-117). What is the support for this? All juvenile GS must pass this location, similar to all WRC must pass this location, so impacts may be significant to the only population of Green sturgeon in the Central Valley. There is no description of how CM1 and the predation effects as part of this CM would be an adverse effect.

<u>Thoughts on other sections</u>

The linkage between beneficial and adverse effects and impact of take on species is not communicated clearly in the Effects Analysis. There is no explanation of why life history diversity would benefit for restoration of resting habitats (5.5-117 ln 33-34). The description of spatial distribution is insufficient in relationship to current and potential distributions. Additionally, this description is contradictory to earlier descriptions of adverse impacts of flow in spawning and rearing habitats in the Study Area (5.5-117 ln 36-40).

The habitat suitability models for salmonids are still underdevelopment and are not at the species or population scale necessary for a BA or BiOp. Agency staff recently met to review the salmonid habitat suitability models, which with further discussion and revision may provide a reasonable tool for evaluating the benefits (and risks) of habitat restoration. This model approach is just being advanced for salmonids as a lump of species (steelhead are included with Chinook), ESU (all Chinook are lumped together), and populations (San Joaquin R and Sacramento R are equal). Due to the coarseness of this tool, it should not be applied to species' or ESU or population level analyses of whether habitat restoration will meet biological goals and objectives, and should only be used for evaluating ecosystem and community goals and objectives. Currently, this modeling approach is being applied to species, when it clearly does not ascertain that level of benefits and risks.